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ABSTRACT

This paper presents the findings of a study comparing the amount of interactivity generated in three different instructional settings: face-to-face instruction in a television classroom, real time instruction via microwave (two-way interactive video), and audioteleconference instruction supplemented with prerecorded videos. The study was conducted using three sessions of a psychology class, all taught by the same instructor, on the psychosocial implications of AIDS. With regard to the face-to-face with video comparison, the data suggests that the presence of the instructor, regardless of site, increases the amount of interaction. The comparison of audio/video with face-to-face instruction produced similar results; however, in the audio condition the majority of students' interactions were comments rather than questions, showing a substantively greater degree of understanding of the material. Three explanations for the differences in quality of interactions are suggested: (1) a difference in the way the class was structured; (2) a difference in the two audiences; and (3) the use of tapes representing different time periods in the class. (ALF)

Is Video Really Necessary? A Study Comparing Interactivity in Video and Audio Classrooms

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Increasingly institutions of higher education are incorporating electronic technologies into their distance delivery systems as a way of enhancing their ability to reach sitebound students. Expansion beyond the traditional print or correspondence mode has been inaugurated for three reasons. One, to enlarge the potential market numerically. Two, to increase accessibility by appealing to and/or being satisfactory for those students for whom a mainly print-based curriculum is inappropriate. Three, to equalize curriculums, or to permit the sharing of resources so that satellite/branch campuses can offer expanded curriculums.

While there are a variety of electronic delivery systems, all of which accomplish the initial goal of reaching more students at a distance, these systems may not be appropriate for distance education students. At least presently, there is insufficient evidence to show that this is the case. Therefore, it is important to have some understanding of the relative capability of each system to make learning (as opposed to exposure) accessible to distance education students. This means identifying those aspects of the systems which contribute to learning. One aspect of particular interest is the amount of interactivity provided (Moore, 1989; Nachtigal, 1991).

Purpose

It is the purpose of this paper to present the findings of a study comparing the amount of interactivity generated in three different instructional settings: face-to-face instruction in a TV classroom, real time instruction via microwave (two-way interactive video), and audioteleconference instruction supplemented with prerecorded videos.

Methods and Procedures

The study was conducted using three sessions of a psychology class on the psychosocial implications of AIDS, all taught by the same instructor. Two of the classes were taught simultaneously--one in the TV classroom on the university campus at which the study originated, one at another university using a microwave system. The third class was taught with videotaped lectures to students distributed throughout the state and linked together via audio.

Each of these classes was recorded either on videotape or audiotape. As a matter of routine, all distance education classes at the university are recorded so that, in the event of technical problems at the receiving end, dubs of the classes can be forwarded to the distant site. Thus, the instructor was aware his class sessions were being recorded but unaware of the study.

Copies of the audiotapes were randomly selected from the

stockpile of tapes left over at the end of the semester. From that sample, representing approximately 10% of the available tapes, only two were from the psychology class. Consequently, only two videotapes were selected for comparison. One of the video tapes was selected at random, one was selected specifically because it was taped during a visit by the professor to the off-campus site of the class delivered by microwave. It was felt that the trade off in terms of random selection was more than offset by the opportunity to detect any differences in interactivity when the instructor was present at the off-campus site.

All of the tapes were then viewed or listened to by a panel of three trained observers who categorized the teacher/student interactions using the Flanders Interaction Analysis (Flanders, 1970). The following behaviors were recorded:

Teacher behaviors
1. Teacher accepts student's feelings
2. Teacher praises student
3. Teacher accepts or uses student's ideas
4. Teacher asks question.
5. Teacher lectures
6. Teacher gives directions.
7. Teacher criticizes.

Student behaviors
1. Predictable student response to teacher question.
2. Student-initiated response to teacher.
3. Student-initiated response to another student.

Miscellaneous
1. Silence or confusion
2. Remarks by students and/or teacher pertaining to the technology. (This item was not on original scale.)

Whereas interrater agreement was obtained for most categories, it was not obtained for others. Further investigation revealed that for this class some categories were too ambiguous. As a result, the first three categories of teacher behavior were collapsed into one category indicating any type of response to a student and two additional categories, "student asks question" and "housekeeping question/comment," were included. The effects of this will be discussed later.

Additionally, evaluations of the course by both the students and the teacher were examined for corroborating and/or contradictory evidence of the findings.

Data Analysis and Results

Although the original intent was to conduct an experiment with interactivity as the dependent variable and with mode of delivery as the treatment, it became apparent that direct comparisons between the groups were not possible because the mode of delivery changed the class structure. During the face-to-face and microwave instruction, class participation was interspersed within the live lecture; during the audio teleconferencing sessions, class participation was before and after the videotaped lecture. In both instances, lectures accounted for approximately 2/3 of the class.

Despite this shortcoming, it was felt that an exploratory analysis of the data was still warranted. The results of that analysis follow. Ultimately, three comparisons were made: audio with face-to-face/interactive video; face-to-face with video; and face-to-face with video/audio. These comparisons are reflected in the following tables indicating the absolute numbers of interactions in the relevant categories.

Table I

	SESSION			
	Audio		Face-to-face/Video	
	1	2	3	4
Housekeeping items	6	3	0	11
Teacher responses	14	9	45	49
Student questions	6	0	36	41
Student comments	20	5	1	0
Total student responses	26	5	37	41
Comments related to tech.	3	1	2	3

It should be pointed out here, that Session 2 was interrupted due to weather conditions. Students at two of the largest sites canceled class right after the introduction of the video viewing and did not participate in discussion at all. The other sites reconvened after the videos, but participation was minimal (presumedly because of concern for the weather).

Table II

	SESSION			
	3		4	
Site	A	B	A	B
Housekeeping items	0	0	11	0
Teacher responses	18	27	36	13
Student questions	11	25	34	7
Student comments	0	1	0	0
Student questions/comments	11	26	34	7
Comments related to tech.	2	0	0	3

Note: 3A and 4B= video
3B and 4A= face-to-face

Table III

	Audio	Video	Face-to-face
Housekeeping items	9	0	11
Teacher responses	23	31	63
Student questions	6	18	59
Student comments	25	0	1
Student questions/comments	31	18	60
Comments related to tech.	4	5	0

Discussion of results

With regard to the audio and the face-to-face/video comparisons, the most striking phenomenon was the difference in the total number of student questions and comments (31 to 78, respectively) and teacher responses (23 to 94, respectively). Even when the shortened audio session is taken into account, the absolute number of responses seems to be quite discrepant. To understand this discrepancy, it is necessary to look at the other comparisons. For that reason, we will come back to this comparison later.

With regard to the face-to-face with video comparison, the data suggests that the presence of the instructor, regardless of site, increases the amount of interaction. Combining 3A with 4B (video) and 3B with 4A (face-to-face), the total number of student question/comments is 18 to 60, respectively. The number of teacher responses reflects the same pattern (31 to 63). That the teacher responses should parallel student responses is not surprising since the majority of student responses were questions which were then followed by a response from the teacher, usually a direct answer to the question followed by a lengthy elaboration. The other comments by the instructor were more in the vein of banter ("You're very quiet up there in Cheyenne") or clarification of circumstances ("I guess the silence means that you have no questions"). In ny case, it is clear that having the instructor in the same room has a positive effect on the quantity of interaction.

This supposition is supported by the fact that the comparison of audio/video with face-to-face instruction produced similar results in that the combined audio sessions total 31 student interactions compared to 60 in the face-to-face sessions. However, it is important here to look at the quality of the interaction. In the audio condition, the majority of the student interactions were comments not questions (25 of 31), unlike the other sessions where the student response was almost entirely questioning (77 of 78). More importantly, the comments were substantively superior to the questions, connoting a greater degree of understanding of the material. At times, the comments were followed by questions, but these too demonstrated higher levels of thinking.

There are three plausible explanations for the different types of responses. The first is the fact that there was a difference in the way the class was structured. In the audio sessions, the lecture was prerecorded and then viewed independently. It is possible that any questions of a strictly informational type were either answered with additional viewing or forgotten. Evidence supporting the former comes from the class evaluations where the students indicated that they usually watched the videos more than once and where they made such comments as "[I]f you don't understand something you can't ask immediately." When the lecture was delivered live and the interaction was integrated into the lecture as in the other two formats, it was easy to interrupt the instructor for clarification. Even so this is apparently more likely when the instructor is in the same room, since the video students asked more questions than the audio students but far fewer

than the face-to-face students.

The second explanation for the difference in the quality of the interaction may be because the two situations involve different audiences. Admittedly, the audio audience was probably comprised of a greater number of non-traditional students who tend to synthesize information and to draw relationships between what they are learning and their own experiences (Schmeck, 1983). Again, some support for this argument can be culled from the evaluations which show that the audioteleconferencing students found the class "personally relevant." Unfortunately, the classes on campus did not fill out the same evaluation form, so this could not be compared.

The third explanation for the difference in the quality of the interaction may be the fact that the tapes represent different time periods in the class. As a matter of chance, the videos were from sessions which occurred earlier in the class and it may be that this is when the students had the most questions.

All three explanations seem credible and it is the contention of the authors that the discrepancy is sufficiently large to suspect that several factors are interacting to contribute to it. In terms of implications for educators, however, the first explanation generates the most interest. It suggests that not all interactions are equal and supports Ritchie and Newby's (1989) study which found that only a small proportion of the interaction is above the knowledge/comprehension level. It thus raises instructional design issues. For instance, does the independent video viewing allow additional time for the student to cogitate and internalize the information? Does such a format focus the attention of the students on more substantive issues? These are issues which need to be addressed and which demonstrate that interactivity is a very complex topic.

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